REUTER
easy-tech for sheet metal works

November 2010

Catalogue

Electrochemical Cleaning, Polishing, Marking, Galvanising

Clean + passivate
welded seams
in one operation ...

Mark metal surfaces
light + dark ...

Copper plating,
galvanising,
gold plating...

Efficient, fast + inexpensive

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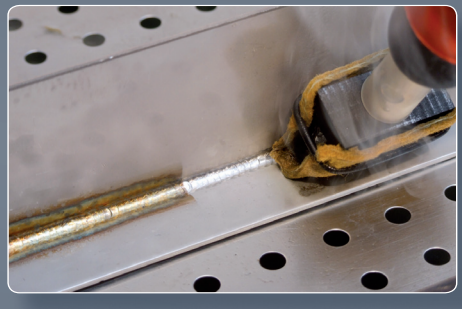
Further information:
www.oreuter.de

All prices in this catalogue are subject to value added tax, shipping charges ex-works and change without notice.

Application Examples



Welded Seam Cleaning

By electrochemical means it is possible to clean and passivate stainless steel welded seams of undesirable discolorations, oxidation and light scaling without damaging the surface structure of the metals. Unlike the grinding or brushing process, desirable surface properties (e.g. ground, brushed, polished or matte finished) are retained.

In contrast to aggressive spray pickling or pickling pastes, which are usually made of toxic hydrofluoric or nitric acids and whose disposal is costly, environmentally-friendly mineral acids are used in electrochemical pickling. These can be diluted with water without problems and neutralised for disposal.

The electrolytic reaction accelerates the redox processes – resulting in exceptional cleaning results even where the pickling electrolytes are present in very low concentrations.

Polishing

Undesirable discolorations often occur on the heat-affected zones of welds which cannot be completely removed by cleaning. By means of electrochemical polishing with a corresponding polishing electrolyte (POLISHER) it is possible to remove these discolorations. The surface, which is frequently matte at the edges, can be adapted to the gloss level of the cleaned welded seams. Stronger discolorations and slight scaling can be worn down and lightly levelled off. The desired gloss level, including a reflective surface, can be achieved by means of prolonged polishing.

Marking

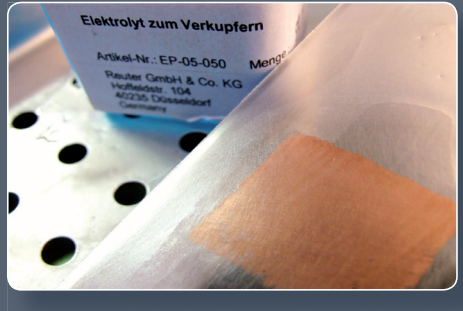
Every electrically conductive metal surface can be etched with our Cleanox IV and Galvanox devices. For each metal you only require the corresponding electrolyte and a long-life stencil or a label printer with special marking tapes. There are two different types of etching: dark etching and light etching.

Dark marking is an oxidation process which is carried out with an electrolyte and a connected electric current. Material is neither applied nor removed, and the surface structure is not changed. The marking penetrates in the µ range into the surface of the material and is therefore permanently visible and resistant to mechanical or chemical attack.

In the case of **light marking** material is removed – which is why the term marking is used. In the same manner as for polishing, a special electrolyte and a current are used to remove material in the µ range from the surface – the marking appears as an indentation without discolouration in the surface of the metal and is also permanently visible and counterfeit-proof.

Derusting

Rusty stainless steel surfaces can be cleaned and passivated with our Cleanox devices. Welded seams are often not cleaned thoroughly enough by surface grinding or incorrect pickling: the cause of rust. Also extraneous rust produced by grinding dust or as a result of coming into contact with ferritic materials can be easily removed by electrolytic cleaning with our Cleanox devices. At the same time you passivate the surface and protect it sustainably against corrosion.



Galvanising

With our Galvanox device and the corresponding electrolytes you can create metallic coatings in the µ range. In this manner it is possible to e.g. copper-plate, gold-plate, silver-plate, nickel-plate or tin-plate surfaces, while welded seams on galvanised components can be subsequently galvanised etc etc.

Magic or electrochemistry?

Read ‚The Electrochemical Process' on page 18

Devices

With the set of devices you save over 10% on accessories compared to individual purchases

Cleanox I: The Specialist

The cleaning device Cleanox I quickly removes discolorations and oxide layers from TIG welded seams. At the same time the surface is passivated and thereby reliably protected against corrosion damage.

The advantages at a glance:

- Electrochemical cleaning of stainless steel TIG welded seams quickly + in an environmentally-friendly manner
- Without the use of toxic pickling products
- Compact housing in a modern design
- High-performance transformer
- Instantaneous passivation of the cleaned stainless steel surfaces
- Outstanding corrosion resistance of the cleaned surfaces
- No pickling edges
- No colour or structural changes to the metal surfaces
- Free of hydrofluoric and nitric acids

Technical Data

Operating voltage	230 V – 50 Hz
Rating	400 VA
Electrode voltage	24 V
Weight	7,5 Kg
Dimensions DxBxH mm	275 x 140 x 200
Protection	IP23

Article no.	Description	Quantity	Price in €
EP-01-001	Cleanox I – Device without accessories	1 piece	490,00
EP-01-011	Cleanox I – Device set including accessories	1 set	595,00
	Device set: the accessories		
EP-02-011	Cleaning and polishing stamp with 60° carbon electrode	1 piece	79,00
EP-07-003	Earth crocodile clip	1 piece	8,50
EP-07-004+005	Electrode cable red + black	2 pieces	2x 14,50
EP-03-111	Cleaning and marking felts white	10 pieces	3,90
EP-07-001	Wide-necked container	500 ml	2,85
EP-03-000	O-rings	10 pieces	3,99
EP-04-100	CLEANER electrolyte	0,5 kg	8,50
EP-07-017	Plastic box	1 piece	23,70

Additional information and further optional accessories can be found on the following pages

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Cleanox II: The Marathon Man

The cleaning device Cleanox II quickly removes tarnishes and oxide layers from TIG welded seams and polishes discolorations in heat-affected zones. At the same time the surface is passivated and thereby reliably protected against corrosion damage. With its very high duty cycle the device is designed for the professional user.

The advantages at a glance:

- Electrochemical cleaning of stainless steel TIG welded seams quickly + in an environmentally-friendly manner
- Without the use of toxic pickling products
- Compact housing in a modern design
- high duty cycle
- High-performance transformer
- Instantaneous passivation of the cleaned stainless steel surfaces
- Outstanding corrosion resistance of the cleaned surfaces
- No pickling edges
- No colour or structural changes to the metal surfaces
- Free of hydrofluoric and nitric acids

Tip: professionals can save a good deal on accessories – by purchasing larger packaging units. See the following pages.

Article no.	Description	Quantity	Price in €
EP-01-002	Cleanox II – Device without accessories	1 piece	650,00
EP-01-012	Cleanox II – Device set including accessories	1 set	755,00
	Device set: the accessories		
EP-02-009	Cleaning and polishing stamp, teflon	1 piece	69,00
EP-02-001	60° carbon electrode	1 piece	24,90
EP-07-003	Earth crocodile clip	1 piece	8,50
EP-07-004+005	Electrode cable red + black	2 pieces	2x 14,50
EP-03-111	Cleaning and marking felts white	10 pieces	3,90
EP-03-222	Cleaning and marking felts kevlar	10 pieces	14,90
EP-07-001	Wide-necked container	500 ml	2,85
EP-03-000	O-rings	10 pieces	3,99
EP-04-100	CLEANER electrolyte	0,5 kg	8,50
EP-04-300	POLISHER electrolyte	0,5 kg	11,90
EP-07-017	Plastic box	1 piece	23,70
EP-07-002	Spray bottle for destillied water	1 piece	8,95

Additional information and further optional accessories can be found on the following pages

Technical Data

Operating voltage	230 V – 50 Hz
Rating	400 VA
Electrode voltage	24–35 V
Weight	8 Kg
Dimensions DxBxH mm	275 x 140 x 200
Protection	IP23

Professional device only
895 €

Cleanox IV: The All-Rounder

The cleaning and marking device Cleanox IV combines four functions in one compact device: it removes tarnishes and oxide layers from TIG welded seams and passivates the surface at the same time. It polishes stainless steel surfaces and welded seams, as well as marking them.
The device is easy to operate by means of a central rotary switch; with its high duty cycle it is designed for the professional.

The advantages at a glance:

- Electrochemical cleaning of stainless steel TIG welded seams quickly + in an environmentally-friendly manner without the use of toxic pickling products
- Instantaneous passivation of the cleaned stainless steel surfaces
- Outstanding corrosion resistance of the cleaned surfaces
- No pickling edges
- No colour or structural changes to the metal surfaces
- Free of hydrofluoric and nitric acids
- Markes all electrically conductive metal surfaces, dark and light
- Negative marking of aluminium
- Electrochemical polishing function EMC, polishes stainless steel surfaces
- Removes colour changes to the heat-affected zones of welded seams by EMC
- Compact housing in a modern design
- High-performance transformer with 400 VA
- High duty cycle
- For visually perfect surfaces and welded seams

Technical Data

Operating voltage	230 V – 50 Hz
Rating	400 VA
Electrode voltage	24–35 V
Weight	9 Kg
Dimensions DxBxH mm	275 x 140 x 200
Protection	IP23

Article no.	Description	Quantity	Price in €
EP-01-004	Cleanox IV – Device without accessories	1 piece	790,00
EP-01-014	Cleanox IV – Device set including accessories	1 set	895,00
	Device set: the accessories		
EP-02-008	Cleaning and polishing stamp, red	1 piece	45,00
EP-02-001	60° carbon electrode	1 piece	24,90
EP-07-003	Earth crocodile clip	1 piece	8,50
EP-07-004+005	Electrode cable red + black	2 pieces	2x 14,50
EP-03-111	Cleaning and marking felts white	10 pieces	3,90
EP-03-222	Cleaning and marking felts kevlar	10 pieces	14,90
EP-07-001	Wide-necked container	500 ml	2,85
EP-03-000	O-rings	10 pieces	3,99
EP-04-100	CLEANER electrolyte	0,5 kg	8,50
EP-04-300	POLISHER electrolyte	0,5 kg	11,90
EP-04-444	Electrolyte for marking stainless steel	50 ml	5,50
EP-07-002	Spray bottle for destillied water	500 ml	8,95
EP-07-017	Plastic box	1 piece	23,70

Additional information and further optional accessories can be found on the following pages

Galvanox: The Golden Boy

Galvanox offers the full functionality of the Cleanox IV: cleaning, passivation, polishing and marking. Furthermore, with the Galvanox you can apply galvanic coatings to smooth metal surfaces: for example nickel, zinc, copper, silver or gold. Every metal requires a different voltage for electrolysis; this can be precisely adjusted with the Galvanox and read off via the large LCD display.

The advantages at a glance:

- Electrochemical cleaning of stainless steel TIG welded seams quickly + in an environmentally-friendly manner without the use of toxic pickling products
- Instantaneous passivation of the cleaned stainless steel surfaces
- Outstanding corrosion resistance of the cleaned surfaces
- No pickling edges
- No colour or structural changes to the metal surfaces
- Free of hydrofluoric and nitric acids
- Markes all electrically conductive metal surfaces, dark and light
- Negative marking of aluminium
- Electrochemical polishing function EMC, polishes stainless steel surfaces
- Removes colour changes to the heat-affected zones of welded seams by EMC
- Application of galvanic coatings to smooth metal surfaces: nickel-plating, galvanising, copper-plating, silver-plating, gold-plating
- Compact housing in a modern design
- High-performance transformer with 400 VA
- High duty cycle
- For visually perfect surfaces and welded seams

Undreamt-of possibilities for product finishing

Article no.	Description	Quantity	Price in €
EP-01-005	Galvanox – Device without accessories	1 piece	1.190,00
EP-01-015	Galvanox – Device set including accessories	1 set	1.290,00
	Device set: the accessories		
EP-02-009	Cleaning and polishing stamp, red	1 piece	69,00
EP-02-001	60° carbon electrode	1 piece	24,90
EP-07-003	Earth crocodile clip	1 piece	8,50
EP-07-004+005	Electrode cable red + black	2 pieces	2x 14,50
EP-03-111	Cleaning and marking felts white	10 pieces	3,90
EP-03-222	Cleaning and marking felts kevlar	10 pieces	14,90
EP-07-001	Wide-necked container	500 ml	2,85
EP-03-000	O-rings	10 pieces	3,99
EP-04-100	CLEANER electrolyte	0,5 kg	8,50
EP-04-300	POLISHER electrolyte	0,5 kg	11,90
EP-04-444	Electrolyte for marking stainless steel	50 ml	5,50
EP-04-101	Electrolyte for galvanising, copper	100 ml	14,90
EP-07-002	Spray bottle for destillied water	500 ml	8,95
EP-07-017	Plastic box	1 piece	23,70

Additional information and further optional accessories can be found on the following pages

Technical Data

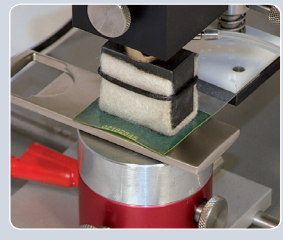
Operating voltage	230 V – 50 Hz
Rating	400 VA
Electrode voltage	0–35 V
Weight	10 Kg
Dimensions DxBxH mm	275 x 140 x 200
Protection	IP23

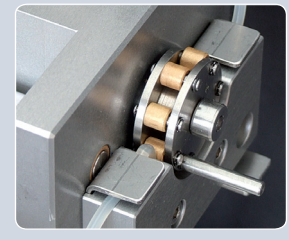
Marking Station M1: Simply Precise

Etch metal parts within seconds. Your signature remains accurately aligned at all times. The M1 marking station is therefore suitable for your large-scale production.

The advantages at a glance:

- Suitable for light and dark marking
- Fully automatic electrolyte feed
- Precise alignment of the stencil using various adjustment screws
- Rapid changing of the stencils
- Marking within seconds
- Particularly suitable for series production
- Inexpensive and maintenance-free





Article no.	Description	Quantity	Price in €
EP-01-009	Marking station M1 (without marking device)	1 piece	1.450,00
EP-01-019	Marking station M1 including Cleanox IV	1 piece	1.989,00
	Optional accessories		
	Machine stamp in various sizes		
	Framed and unframed stencils in various sizes		
	Suitable devices: Cleanox IV or Galvanox		
	Electrolyte for various metals for dark or light marking		
	Neutralyte for protection against corrosion after the marking of sensitive metal surfaces		
	Marking felts		

Additional information and further optional accessories can be found on the following pages

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Device Trolley: Robust & Mobile

This device trolley is indestructible. Smooth-running industrial rollers allow the entire marking station to glide noiselessly through your halls.

The advantages at a glance:

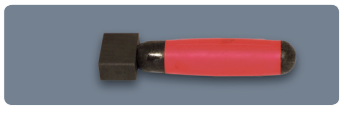
- Device trolley made of stable plastic
- Load-bearing capacity 200 kg
- Working surface with high sidewalls for catching liquids
- Lockable drawer for the accessories
- Acid-resistant and not electrically conductive
- Many storage compartments for electrolytes
- Containers integrated in the handle for the electrode handles
- Integrated cable feedthroughs and hooks

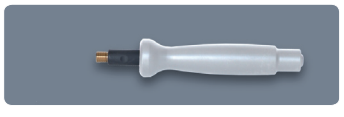
Article no.	Description	Quantity	Price in €
EP-06-001	Device trolley	1 piece	479,00
EP-06-011	Device trolley and Cleanox IV	set	1.250,00

Accessories

Electrode Handles

Ergonomically shaped handles for Cleanox and Galvanox devices in various designs and materials; for all cleaning, marking and polishing work; with or without carbon electrode





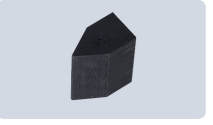
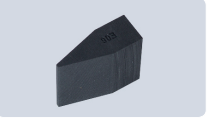
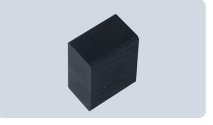
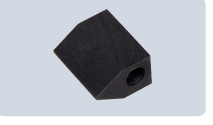
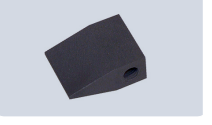
Description	Article no.	Quantity	Price in €
Cleaning and Polishing Handle with 60° Carbon Electrode Ergonomically shaped handle, air cooled and thermally insulated; M10 thread; including Carbon electrode	EP-02-011	1 piece	79,00
Marking Handle with 90° Carbon Electrode Due to the soft touch surface the handle feels very pleasant in your hand; particularly suitable for marking; M10 thread; including carbon electrode	EP-02-033	1 piece	65,00
Cleaning Handle with 60° Carbon Electrode Due to the soft touch surface the handle feels very pleasant in your hand; particularly suitable for cleaning; M10 thread; including carbon electrode	EP-02-018	1 piece	69,00
Long Handle with 60° Carbon Electrode With soft touch handle; for difficult-to-access locations; M8 thread; including carbon electrode	EP-02-044	1 piece	89,00
Cleaning and Polishing Handle Ergonomically shaped handle made of Teflon; highly temperature and acid-resistant; particularly suitable for polishing; M10 thread; without carbon electrode	EP-02-009	1 piece	69,00
Marking Handle Ergonomically shaped handle with soft touch surface; particularly suitable for marking; M10 thread; without carbon electrode	EP-02-030	1 piece	42,00
Cleaning Handle Ergonomically shaped handle with soft touch surface; particularly suitable for cleaning; M10 thread; without carbon electrode	EP-02-008	1 piece	45,00
Long Handle With soft touch handle; for difficult-to-access locations; M8 thread; without carbon electrode	EP-02-040	1 piece	72,00

Carbon Electrodes

Spare Electrodes for Cleanox and Galvanox Devices

Description	Article no.	Quantity	Price in €
60° Carbon Electrode all-purpose: cleaning, polishing and marking M10 thread	EP-02-001	1 piece	24,90
30° Carbon Electrode for difficult-to-access locations – particularly for cleaning fillet welds; M10 thread	EP-02-002	1 piece	27,50
90° Carbon Electrode specifically for marking; M10 thread	EP-02-003	1 piece	22,90
60° Carbon Electrode with M8 thread for long handle	EP-02-101	1 piece	26,90
30° Carbon Electrode with M8 thread for long handle	EP-02-202	1 piece	28,90
Machine Stamp for marking station M1 with automatic electrolyte feed; 30 x 15 mm	EP-02-004	1 piece	148,90

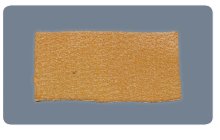
Other electrodes available on request

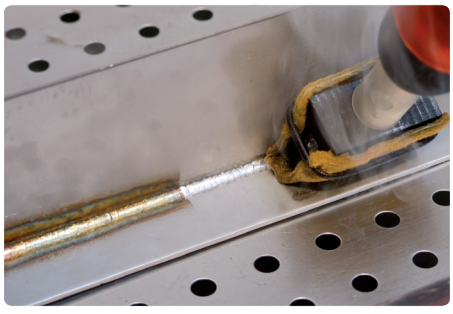






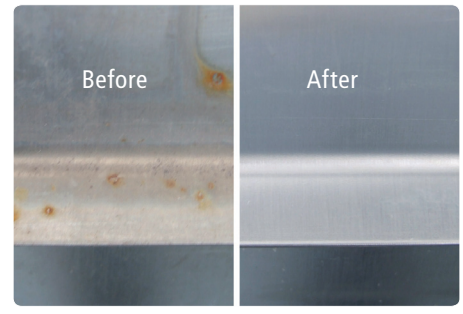
Felts and O-Rings

Spare Felts and O-rings for Cleanox and Galvanox Devices

Description	Article no.	Quantity	Price in €
Cleaning and Marking Felts, white ideal for cleaning and marking slightly tarnished WIG welded seams	EP-03-111 EP-03-001 EP-03-011	10 pieces 20 pieces 100 pieces	3,90 6,90 25,80
Cleaning and Marking Felts, Kevlar very hard-wearing felt made of Kevlar fibre ® – for challenging cleaning and marking	EP-03-222 EP-03-002 EP-03-022	10 pieces 20 pieces 100 pieces	14,90 22,75 98,70
O-rings for fixing the felts in place on the carbon electrode	EP-03-000	10 pieces	3,99







Cleaning Electrolytes

for the environmentally-friendly cleaning of TIG welded seams and stainless steel surfaces; passivates in the same operation

Description	Article no.	Quantity	Price in €
CLEANER Electrolyte – for cleaning WIG welded seams – removes discolorations and oxides – passivates the surface and protects against corrosion	EP-04-100	0,5 kg bottle	8,50
	EP-04-001	1 kg can	13,65
	EP-04-011	6 x 1 kg can	65,90
	EP-04-111	5 kg canister	49,99
SUPERCLEANER Electrolyte – for cleaning strongly tarnished WIG welded seams – ideal for high-gloss surfaces – passivates the surface, protects against corrosion	EP-04-200	0,5 kg bottle	9,50
	EP-04-002	1 kg can	17,95
	EP-04-022	6 x 1 kg can	89,90
	EP-04-222	5 kg canister	65,85

Polishing Electrolytes

for the environmentally-friendly polishing of TIG welded seams and stainless steel surfaces; passivates in the same operation

Description	Article no.	Quantity	Price in €
POLISHER Electrolyte – for polishing WIG welded seams and stainless steel surfaces – removes discolorations in heat-affected zones – produces high-gloss, reflective surfaces	EP-04-300	0,5 kg bottle	11,90
	EP-04-003	1 kg can	19,90
	EP-04-033	6 x 1 kg can	98,70
	EP-04-333	5 kg canister	85,60

Marking Electrolytes

for all metallic materials and surfaces

Description	Article no.	Quantity	Price in €
Rustproof high-alloy steels 1.4021-1.4310	EP-04-444 EP-04-004 EP-04-040 EP-04-044	50 ml 100 ml 500 ml 1.000 ml	5,50 8,33 39,90 69,90
Cu-Zn alloys, brass, copper etc.	EP-04-555 EP-04-005 EP-04-055	50 ml 100 ml 1.000 ml	5,75 8,55 75,10
Construction and tool steels, steels susceptible to corrosion	EP-04-666 EP-04-006 EP-04-066	50 ml 100 ml 1.000 ml	5,60 8,35 71,59
Aluminium and high-alloy steels	EP-04-777 EP-04-007 EP-04-077	50 ml 100 ml 1.000 ml	5,85 8,90 79,87
Hardened steels	EP-04-888 EP-04-008 EP-04-088	50 ml 100 ml 1.000 ml	6,50 9,50 81,85
Neutralyte with pH indicator – for the after-treatment of steels which are susceptible to corrosion – indicates when the marking electrolyte is neutralised and the treated surface protected against corrosion	EP-04-009 EP-04-099	100 ml 1.000 ml	5,90 54,90
...further electrolytes available on request			

Galvanising Electrolytes

for the application of galvanic coatings to smooth metal surfaces with our Galvanox device

Description	Article no.	Quantity	Price in €
Galvanising electrolyte copper	EP-04-101	100 ml	14,90
Galvanising electrolyte nickel	EP-04-102	100 ml	13,90
Galvanising electrolyte zinc	EP-04-103	100 ml	12,59
Galvanising electrolyte silver	EP-04-104	100 ml	52,46
Galvanising electrolyte gold	EP-04-105	100 ml	68,97
...further electrolytes available on request			

Marking Stencils

can be reused up to 2,000 times. Unframed stencils are very flexible and suitable for marking curved surfaces. Framed stencils are more stable and somewhat easier to handle. For production we require a camera-ready file from you (preferably PDF).

Description	Size	Article no.	Price / piece €
Reproduction and Phototypesetting Costs per long-life stencil		EP-05-000	15,00
Long-life stencil framed	30 x 15 mm	EP-05-001	12,90
Long-life stencil unframed	30 x 15 mm	EP-05-011	8,90
Long-life stencil framed	40 x 15 mm	EP-05-002	14,90
Long-life stencil unframed	40 x 15 mm	EP-05-022	9,00
Long-life stencil framed	1–30 cm^2	EP-05-101	21,90
Long-life stencil unframed	1–30 cm^2	EP-05-111	12,90
Description	**Size**	**Article no.**	**Price per cm^2 €**
Long-life stencil framed	31–60 cm^2	EP-05-102	0,51
Long-life stencil unframed	31–60 cm^2	EP-05-112	0,45
Long-life stencil framed	61–1000 cm^2	EP-05-103	0,50
Long-life stencil unframed	61–1000 cm^2	EP-05-113	0,42

Label Printers: Completely Individual

Create your own stencils quickly and inexpensively for marking. You can create the inscription directly on the device or import it via USB interface from your computer – thanks to the user-friendly editor software it is possible to use all of the fonts and symbols installed on the PC. Depending on requirements, you have marking tapes available in widths of 18 mm, 24 mm and 36 mm. The stencils can be reused several times. As they are battery operated they work everywhere.

The device at a glance:

- USB connection for use with the PC
- Includes software package for PC/MAC
- 8 installed fonts, 10 different printing styles for creation of the signature without PC
- Time and date function
- Includes accessories: mains adapter, hard-top case, USB cable, user manual, software on CD-ROM, installation instructions and tape cartridge
- Weight: 850 g, dimensions (BxDxH): 180 x 248 x 72 mm

Articel no.	Description.	Quantity	Price in €
EP-05-200	Label printer 2700VP for 18 – 24 mm marking tapes	1 piece	169,00
EP-05-201	Label printer 3600VP for 18 – 36 mm marking tapes	1 piece	399,00
	Zubehör		
EP-05-210	Marking tape TZ 18 mm, 3 m long for 2700VP and 3600VP	1 piece	21,90
EP-05-211	Marking tape TZ 24 mm, 3 m long for 2700VP and 3600VP	1 piece	29,90
EP-05-212	Marking tape TZ 36 mm, 3 m long for 3600VP	1 piece	36,60

Safety Accessories

Description	Article no.	Price / piece €
Stainless Steel Trough – ideal for cleaning and marking smaller parts – with integrated power supply jack – made of acid-resistant stainless steel – size: ca. 300 x 200 x 30 mm	EP-06-002	59,00
Protective Goggles – against acid splashes	EP-06-003	9,90
Gloves – acid-resistant	EP-06-004	5,90
Skin Protection Cream – protects against liquids and acids – ‚liquid glove'	EP-06-006	12,85
Plastic Box – for storing and transporting your set of devices – no contents	EP-07-017	23,70
Wide-necked Container	EP-07-001	2,85
500 ml Spray Bottle – for distilled water – no contents	EP-07-002	8,95
Apron – made of plastic, against acid splashes – no contents	EP-06-005	10,90

Spare and Wearing Parts

Description	Article no.	Price / piece €
Crocodile Clip – current terminal for connecting to the work piece – crocodile clip, red	EP-07-003	8,50
Electrode Cable / Extension Cable between device and electrode		
– connecting cable, red, 2 m	EP-07-004	14,50
– connecting cable, black, 2 m	EP-07-005	14,50
– extension cable, red, 2 m	EP-07-114	14,90
– extension cable, black, 2 m	EP-07-115	14,90
Power Supply Jacks for devices and electrode handles		
– device jack, red	EP-07-006	2,99
– device jack, black	EP-07-007	2,99
– handle jack, black	EP-07-008	2,85
– jacks for stainless steel trough, red	EP-07-108	2,85
Overload Fuse for protecting against overheating and short-circuits		
– fuse 15 A	EP-07-011	15,90
– fuse 20 A	EP-07-012	18,90
Rectifier converts alternating current to direct current		
– rectifier 25 A	EP-07-013	35,60
– rectifier 50 A	EP-07-014	54,90
Spare Parts for Electrode Handles		
– red cleaning handle without inner part	EP-07-109	19,00
– black cleaning handle without inner part	EP-07-009	21,00
– red marking handle without inner part	EP-07-209	19,00
– white polishing handle without inner part	EP-07-309	34,90
– brass inner part, for black or white handles	EP-07-010	39,00
– brass inner part, for red handles	EP-07-020	38,00

Process Techniques

Magic? Or electrochemistry?

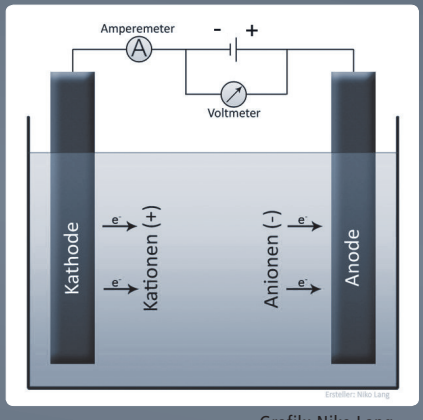
The electrochemical process

A process in which an electric current forces a chemical reaction is known as **electrolysis**. Part of the electrical energy is converted into a chemical reaction:

Between an anode (+) and a cathode (-) a direct current is connected in a conducting electrolyte fluid. Reaction products are formed on the electrodes from the substances contained in the electrolyte. The voltage source causes an electron deficiency at the positive pole (anode) and excessive electrons at the negative pole. The positively charged cations migrate to the negatively charged cathode. On the cathode they (or other reactants) absorb electrons and are reduced as a result. The opposite process occurs at the anode.

If the work piece to be processed serves as an anode (+) and the cleaning stamp is switched to minus (-), **material and impurities are removed** with the corresponding electrolyte. We use this effect for polishing and cleaning. If the polarity is reversed, i.e. the work piece becomes the cathode, **material can be applied** – this is referred to as **galvanisation** (e.g. copper plating, zinc plating).

Electrolysis



Grafik: Niko Lang

During polishing, which is also known as electrochemical polishing EMC, we make use of electrolysis for the removal of oxides and material: we make the work piece to be cleaned the anode (+) and use a highly concentrated mineral acid as the electrolyte. Roughness „peaks" are removed more quickly during this procedure than roughness „valleys". The nano-roughness is also reduced, thereby creating the shine. Structures in the macro range are retained. Edges and corners are worn away more intensely, resulting in extremely fine deburring. The work pieces should be cleaned and degreased beforehand. Electrolytic pickling or cleaning is ideally suited to this purpose.

Electrolytic cleaning is mainly carried out with direct current in order to prevent material removal and structural changes. Due to the 50 Hz alternating current the anode and cathode of the work piece to be cleaned alternate permanently, as a result of which the removal of material is kept to a minimum and the oxides and tarnishes can be released more readily.

Why carryout cleaning and passivation?

The very good corrosion resistance of **stainless steel** comes about due to the build-up of an oxide film – with the high chromium share reacting with oxygen. This is referred to as passivation. This natural passive layer can be negatively affected during mechanical processing or heat treatments such as welding. As a rule this results in corrosion damage even in the case of highly alloyed stainless steels.

Non-rusting steels display relatively poor heat conduction due to their alloys. The heat is only led away slowly. As a consequence of the heating process, inner and outer oxidation occurs in the area of the welded seam. Furthermore, this may - depending on the material - be accompanied by local chromium depletion and the undesirable formation of chromium carbides. Chromium depletion also means a reduction in passivation capacity. The formation of undesirable oxides as a result of heating is identified by the experienced professional by the tarnishing which is formed. In contrast to the original passivating oxide film, these oxides have negative properties. They reduce the resistance to local corrosion. The welding process therefore has to be followed by after-treatment, the aim of which is to restore the original properties.

In **electrochemical cleaning** a protective oxide layer builds up immediately as a result of the oxygen created by electrolysis. The surface is therefore already passivated during the cleaning process in one operation.

Dark marking is an intentional oxidation process – also known as ‚rusting'. Special electrolytes are used whose composition depends on the materials to be treated. On the permeable membranes of the marking stencil the electrolyte induces targeted oxidation by means of direct current. This manifests itself in a dark, mostly brown-black colouration. No material is removed, nor are any substances incorporated into the surface.

In contrast, in the case of **light marking** (also known as etching or negative marking) material is intentionally removed. This is carried out by means of special electrolytes and a direct current. In principle, light marking resembles electrochemical polishing – with the difference that the special electrolytes aggressively wear away the surface structure so that matte, recessed marking can be achieved.

Only a few electrode materials do not become chemically involved during electrolysis and are able to withstand the high thermal loads. For this reason we only use a special carbon material for our electrodes. This possesses very good electrical conductivity properties, a high degree of resistance to chemicals and is able to withstand the high temperatures during electro-polishing.

Company Profile

The graduate mechanical and welding engineer Olaf Reuter, managing partner of the firm Reuter GmbH & Co. KG, is known throughout the industry for his expertise. His 15 years of professional experience in joining technology and voluntary work on DIN committees stand for practice-hardened expertise.

From their warehouse in Düsseldorf, his firm Reuter GmbH & Co. KG supplies state-of-the-art technology for stud welding, blind riveting and self clinching, as well as for electrochemical cleaning – polishing – marking. The devices on offer are developed in Germany and produced in series. Behind each line of devices is the company's own demand for , easy tech for sheet metal works':

- smart solutions which can replace considerably more intricate technologies;
- the easiest possible handling
- a scalable product range – for handicraft businesses and industry
- outstanding price-performance ratio

Reuter supplies:

Stud welding

- Stud welding devices for tip and drawn arc ignition, light manual assembly devices, powerful building site devices, industrial microprocessor devices;
- Welding studs for tip and drawn arc ignition, short cycle, fireproof anchors;

Self clinching

- All types of self-clinching fasteners
- Press-fit machines

Electrochemical cleaning, polishing, marking + galvanising

- Devices, accessories, electrolytes

Riveting technology

- Blind rivets + blind rivet nuts
- Hydropneumatic guns
- Rechargeable battery guns

Further information: www.oreuter.de

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